

LFG-1310  
FUNCTION GENERATOR  
SERVICE MANUAL

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NOTE

These servicing instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the service manual unless you are qualified to do so.

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## 1. SPECIFICATIONS

Frequency Range:	0.01Hz to 10MHz, 9 ranges
Accuracy:	$\times 0.01$ to $\times 100$ k ranges . . . $\pm 5\%$ of full scale $\times 1$ M range . . . $\pm 10\%$ of full scale
Waveforms:	Sine wave, triangle wave, square wave, ramp wave, and pulse wave
Sine wave:	
Flatness:	0.01Hz to 100kHz . . . $\pm 0.3$ dB 100kHz to 10MHz . . . $\pm 1$ dB
Distortion:	10Hz to 50kHz . . . 0.5% or less
Triangle wave:	
Linearity error:	1% at 100Hz
Square wave:	
Rise/fall time:	25ns or less (with max. output)
Symmetry Variation:	20:80 to 80:20 (0.01Hz to 1MHz)
Operation Mode:	
CW:	Continuous generation
TRIG/GATE:	TRIG . . . one cycle oscillation triggered by input signal GATE . . . oscillation only when input is HI
Frequency range:	0.1Hz to 1MHz
Input voltage:	TTL
Input frequency:	DC to 100kHz
Start/stop phase:	Variable
BURST:	Burst wave oscillation for gate time of 1ms to 10s by built-in oscillator. ON/OFF time is symmetrical and variable.
SWEEP:	
Sweep mode:	Selection of linear and logarithmic sweeps
Sweep time:	1ms to 10s, 2 ranges, continuously variable. Fly-back line interval is symmetrical and variable.
Sweep width:	Max. 1:100, continuously variable (sweep start frequency can be specified.)
Output Characteristics:	
Output level:	20Vp-p (output terminal open)
Attenuator:	0, 20, 40, and 60dB, continuously variable
Output impedance:	50ohms $\pm 10\%$
DC offset:	Max. $\pm 10$ V (output opened)
SYNC output:	TTL level (duty cycle are symmetrical and variable.)
GCV output:	Voltage output in proportion to frequency, 0 to 5V (max. frequency in each range)
SWEEP output:	Sweep output in sweep mode, 0 to -5V
SWEEP/BURST gate out:	TTL level
Amplitude Modulation (AM):	Modulation level . . . 0 to 100%, continuously variable Input signal level . . . max. 5Vp-p Suppressed-carrier mode
External Control of Frequency (VCG):	
Frequency range:	Max. 1000:1, with frequency dial set to "10"
Input level:	0 to -5V ( $\pm 20\%$ ) (frequency is decreased by negative voltage)
Power Supply:	100 VAC $\pm 10\%$ 50/60Hz 30VA 120, 200, 220, and 240V available by adjusting the power transformer tap
Size and Weight:	300(W) x 100(H) x 300(D)mm, approx. 3.5kg
Accessories:	Connection cable: LC-204B (50 ohm BNC-clip cable) x 1 Instruction manual x 1 Option: 50-ohm terminator LT-2049

Remarks:

1. The specifications described above are applicable at a temperature of 23°C  $\pm 5^\circ\text{C}$  and a relative humidity of 40 to 85%.
2. Unless otherwise stated, the frequency dial is set to 1 to 10, and SYMMETRY is set OFF for the specification data.

## 2. TEST EQUIPMENT REQUIRED

The following test equipment is required for calibration and servicing of the Model LFM-1310. The suggested specifications are the minimum necessary for proper calibration of this instrument.

<u>Test Equipment</u>	<u>Minimum Spec</u>
- Multimeter	0 - 20V Accuracy < 0.1% 3-1/2 digit
- Oscilloscope	10mV sensitivity 100MHz bandwidth Delayed sweep Low capacitance probe
- Frequency Counter	0.01Hz - 10MHz
- Distortion Meter	1kHz 1% full scale
- Audio Generator	1kHz sine wave
- Function Generator	100kHz TTL signal
- 50 ohm Terminator	Feedthrough

### 3. CALIBRATION PROCEDURE

#### 3.1 General

- Calibration should be performed after a 30 minute warm-up period. It should also be confirmed that the unit is connected to the rated power line voltage.
- During the adjustment procedure, remove the case only when necessary and replace immediately after making an adjustment. This will maintain all circuits at constant operating temperature.
- All adjustments should be completed in the given order, because some adjustments interact with others.

#### 3.2 Initial Control Settings

- The initial control settings to be used for each check and adjustment are listed below. Any variations from these settings are stated in the applicable procedure.

FREQ Dial	10
FREQ RANGE	x100
MODE	CW
FUNCTION	Sine wave
OUTPUT	
DC OFFSET	OFF
ATTENUATION	0dB
VARIABLE	Fully clockwise
SWEEP/BURST/AM MOD	
SYMMETRY	OFF
VARIABLE	Center
AM CARRIER LEVEL	0
TIME	1-100ms
START/MOD LEVEL	Center
SET	START
LIN-LOG	LIN
AM	OFF
TRIG START LEVEL	Center
SYMMETRY	OFF

#### 3.3 Power Supply

- Connect the DC voltmeter between TP3(+17V line) and/or TP4(-17V line), on the pc board(T-3571), and chassis.
- Adjust VR8(T-3571) so that the voltages at the TP3 and TP4 are exactly same absolute value.

- Check all supplies according to Table 3-1.

Voltage	Test point
+14V	D43(T-3570) anode
-14V	D44(T-3570) cathode
+6V	Junction of R53 and R54
+5V	IC13(T-3570) pin3
+5V1	D42(T-3570) cathode

Table 3-1

#### 3.4 Offset Adjustment-1 (Current source)

- Set: FREQ Dial Fully counterclockwise
- FREQ RANGE x100
- Connect the DC voltmeter between TP4 and TP5(T-3570). Note the voltage reading to three places of decimal. Remove the voltmeter.
- Connect the DC voltmeter between TP2 and TP3(T-3570).
- Adjust VR3(T-3570) for exactly same voltage as above noted.

#### 3.5 Buffer Amplifier

- Set: FREQ Dial Fully counterclockwise
- FREQ RANGE x100
- FUNCTION Square wave
- SYMMETRY On
- Connect the oscilloscope to OUTPUT connector and set the TIME/DIV control to 0.1mS, SLOPE button to +. Adjust TIME VARIABLE control for 1 cycle display.

##### (1) Bias Adjustment

- Adjust VR6(T-3570) to the center of the stable oscillation range when rotate the SYMMETRY control at both extreme positions.

##### (2) Symmetry Checking

- Expand the negative going edge, located at the center area of the graticule, 100 times using the delayed sweep mode of the oscilloscope as shown in Figure 3-1.



Figure 3-1

Observe this point

- The displacement of the positive and negative going edge should be less than 0.4%(4 divisions) when switch the SLOPE button between + and -.

3.6 Offset Adjustment-2 (Tuning Amplifier)

- Connect the junction of R1 and VR1(T-3570) to chassis by short clip lead.
- Connect the DC voltmeter to TP2(T-3570).
- Adjust VR2(T-3570) for a voltmeter reading of 0.000V.

3.7 Frequency Adjustment-1(1kHz)

- Set: FREQ Dial 10  
FREQ RANGE x100  
FUNCTION Square wave

- Connect the frequency counter to OUTPUT connector.
- Adjust VR1(T-3570) for a frequency reading of 1.005kHz.

3.8 Symmetry Adjustment-1(Dial "1")

- Set: Same as 3.7
- Connect the frequency counter to OUTPUT connector.

Connect the oscilloscope to SYNC OUT connector and set the TIME/DIV control to 0.1mS/DIV for 1 cycle display.

- Connect the DC voltmeter to TP1(T-3570) and note the voltage. Call the voltage -V.
- Rotate the FREQ Dial clockwise until the voltage reading becomes -V/10.

- Adjust VR4 and VR5(T-3570) alternately to obtain an 100Hz, symmetrical square wave.

### 3.9 Dial Settings

- Set: FREQ Dial	1
FREQ RANGE	x100

- Connect the frequency counter to OUTPUT connector.
- The frequency reading should be between 97Hz and 103Hz.
- If not, reset the FREQ Dial by two set screws on the dial knob for frequency reading of 100Hz then repeat step 3.7 and 3.8 to re-adjust the frequency.

### 3.10 Frequency Adjustment-2(10Hz)

- Set: FREQ Dial	10
FREQ RANGE	x1
FUNCTION	Square wave

- Connect the frequency counter to OUTPUT connector.
- Adjust VR8(T-3570) for a frequency reading of 10.00Hz.

### 3.11 Symmetry Adjustment-2(x1 RANGE)

- Set: FREQ Dial	1
FREQ RANGE	x1
FUNCTION	Square wave

- Connect the oscilloscope to OUTPUT connector and set the TIME/DIV control to 0.1S/DIV then expand the sweep width 10 times using horizontal magnifier mode.
- Adjust VR7(T-3570) precisely so that the displacement of the positive and negative going edge of the square wave should be less than 0.5%(0.25 division) when switch the SLOPE button between + and -. Refer to Figure 3-1.

### 3.12 Frequency Adjustment -3

#### (1) 1MHz

- Set: FREQ Dial	10
FREQ RANGE	x100k
FUNCTION	Square wave

Connect the frequency counter to OUTPUT connector.

- Adjust VC1(T-3570) for a frequency reading of 1.000MHz.

#### (2) 10MHz

- Set: FREQ Dial	10
FREQ RANGE	x1M

- Adjust VC4(T-3570) for a frequency reading of 10MHz.

#### (3) 5MHz

- Set: FREQ Dial	5
FREQ RANGE	x1M

- Check that the accuracy is between 4.8MHz and 5.2MHz.
- If not, adjust VC3(T-3570) so that the frequency reading is 10000 times of the x100 RANGE.
- Repeat the step (1) and (2) if necessary.

#### (4) 100kHz

- Set: FREQ Dial	10
FREQ RANGE	x10k

- Adjust VC2(T-3570) for a frequency reading of 100.0kHz.

### 3.13 Sweep Generator

#### (1) Symmetry Adjustment

Set: SWEEP/BURST/AM MOD

TIME	1-100mS
TIME VARIABLE	Fully counterclockwise
SYMMETRY	OFF
SET	SWEEP

- Connect the oscilloscope to SWEEP/BURST GATE OUT connector.
- Adjust VR4(T-3569) for a symmetrical square wave.

(2) Anti-log Circuit Adjustment

- Adjust following adjustments on the pc board(T-3570) to obtain a waveform as shown in Figure 3-2.

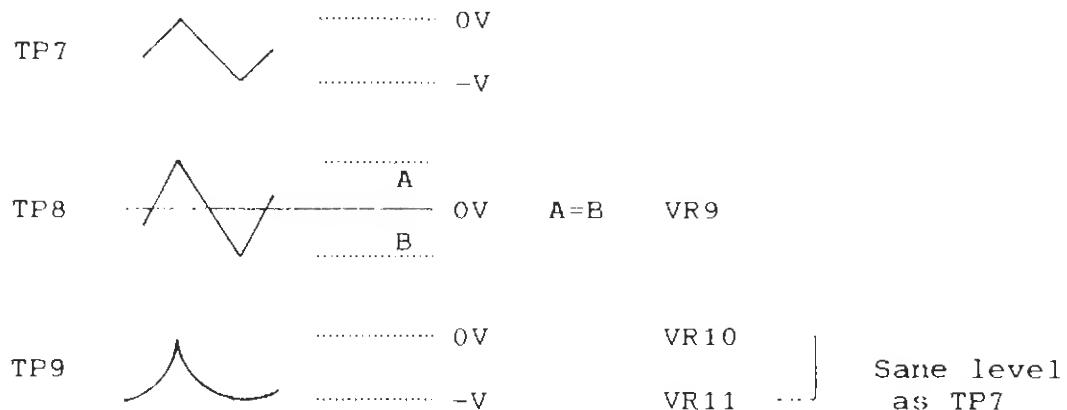


Figure 3-2

3.14 High Frequency Compensation

(1) Gate

- Set:

FREQ Dial	10
FREQ RANGE	$\times 100k$
MODE	GATE
FUNCTION	Sine wave
- Connect the oscilloscope to OUTPUT connector via 50 ohm terminator.
- Apply 100kHz TTL signal from the reference function generator to TRIG IN connector.
- Set the TRIG START LEVEL control to obtain a waveform as shown in Figure 3-3.

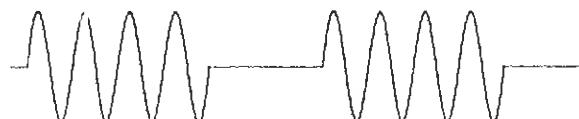


Figure 3-3

- Adjust VC5(T-3570) so that the base line becomes as flat as possible with less ringing and overshoot.

(2) Output Amplifier

- Set: FREQ Dial	1
FREQ RANGE	x1M
MODE	CW
FUNCTION	Square wave
ATTENUATION	0dB
VARIABLE	Fully clockwise

- Connect the oscilloscope to OUTPUT connector via 50 ohm terminator.

Adjust VR1-4 and VC1(T-3571) for a flat top square wave.

- Set: FUNCTION Sine wave
- Adjust vertical sensitivity of the oscilloscope for 6 divisions display.
- Set: FREQ Dial 10
- The sine wave amplitude should be between 5.5 division and 6.5 division.
- Repeat above adjustment if necessary.

3.15 Distortion Adjustment

- Set: FREQ Dial	10
FREQ RANGE	x1k
FUNCTION	Sine wave

- Connect the distortion meter to OUTPUT connector via 50 ohm terminator.
- Adjust VR6 and VR7(T-3571) alternately for minimum sine wave distortion.

3.16 AM Modulation

- Set: FREQ Dial	10
FREQ RANGE	x10k
FUNCTION	Sine wave
SWEEP/BURST/AM MOD	
AM	ON
AM CARRIER LEVEL	Fully clockwise
MOD LEVEL	Fully clockwise

- Connect the oscilloscope to OUTPUT connector.
- Connect the sine wave generator to MOD IN connector and set the frequency to 1kHz, output level for 100% AM.
- Adjust CARRIER LEVEL control and VR5(T-3571) alternately for correct DSB(Double Side Band) waveform as shown in Figure 3-4.

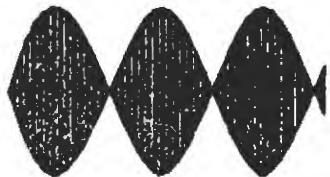


Figure 3-4

#### 4. TROUBLESHOOTING PROCEDURE

##### 4.1 Troubleshooting Aid-1

- Confirm that the any equipment used with the LFG-1310 is operating correctly.
- Check all control settings, because an incorrect setting can make a good unit appear defective. If there is any question about the function, see the INSTRUCTION MANUAL for a correct operation.
- Check all circuit for visual defects such as broken component, loose connections, open wire, poor soldering etc.
- Some troubles can be solved with proper adjustment.
- Check voltage, waveform and state of logic circuit as shown in the "7 BLOCK DIAGRAM/SCHEMATIC DIAGRAM" to trace the defective circuit. Then, troubleshoot the associated circuit and/or the control circuit. Start with the power supply.

##### 4.2 Troubleshooting Aid-2

- (1) Overall operation is not satisfactory or unit is "dead".
  - a. Check the power supplies. Refer to "3.3 Power supply".

Secondary voltage of the power transformer

- +17V: Check IC4 and associated circuit (Adjust VR8)
- 17V: Check IC5 and associated circuit (Adjust VR8)
- +14V: Check D43 and associated circuit
- 14V: Check D44 and associated circuit
- +6V: Check D9 and associated circuit
- +5V: Check IC13 and associated circuit
- +5V1: Check D42 and associated circuit

(2) FUNCTION

- a. No triangle wave comes out with CW MODE.
  - Check that triangle wave is present at TP6.
  - Yes: Check waveform at pin 1 of P2(T-3571) for triangle wave.
  - Yes- Check output amplifier(Q1-9, IC1 T-3571)  
Attenuator(S1, R11-16).
  - No- Check FUNCTION switch(S2 T-3568), AM ON/OFF switch(S3 T-3569), VARIABLE control(VF4, 5).
  - No: Check the triangle generator by following procedure.
    - Apply 1kHz sine wave from audio generator to the gate of Q7(T-3570) and set the amplitude about 10Vp-p.
    - Check that the clipped sine wave is present at the OUTPUT connector.
    - Yes- Connect the DC voltmeter to TP1(T 3570). The voltage reading should be between about -60mV and -5.5V when rotate the FREQ dial from fully clockwise to fully counterclockwise. And also, the voltage at the TP3 and 4 are proportioned to the voltage at TP1.
    - If the voltage changes correct, check current sources(IC4, 5, Q3-6), diode bridge(D3-10 T-3570).
    - If the no voltage is present, check tuning amplifier(IC1 T-3570) and SYMMETRY control.
  - No- Check comparator(IC7, Q13-20 T-3570), buffer amplifier(Q7-10 T-3570).
- b. No sine wave comes out
  - Confirm that the triangle function works correctly.
  - Yes: Check waveform and DC voltage at the sine wave converter(Q15-20 T-3571), FUNCTION switch and associated circuit.
  - No: Check the triangle generator.
- c. Distorted sine wave comes out
  - Adjust VR6, 7(T-3571). Refer 3.16.
- d. No square wave comes out
  - Confirm that the triangle function works correctly.
  - Yes: Check FUNCTION switch and associated circuit.
  - No: Check the triangle generator.
- e. No frequency change or intermittent by rotating FREQ dial.
  - Check VR1, FREQ RANGE switch and range capacitors(C17-22).
  - If x1 and lower ranges do not work, check capacitance multiplier(IC6, Q11, 12 T-3570).

f. No SYMMETRY control works

Check S1, VR1(T-3569) and associated circuit.

g. No DC OFFSET works

Check IC1(T-3570) and associated circuit.

(3) Burst

a. No burst signal comes out

Check waveform at TP7(T-3570) for triangle wave which frequency is changed by rotate the TIME VARIABLE control.  
Yes: Check input signal at following points of burst gate (T-3570).

Pin 4 of IC9 for triangle wave

Pin 5 of IC8 for square wave

Pin 1 of IC8 for square wave

DC voltage at pin 9 of IC9 from -6.7V to -12V when rotate TRIG START LEVEL control.

Yes- Check burst gate(IC8, Q21, 22, 32 T-3570) and associated circuit.

No Check the signal sources

No: Integrator(IC10 T-3570), comparator(IC11, 12, Q26-30 T-3570) and associated circuit.

b. TRIG MODE

Check one-shot multivibrator(IC1 T-3568) and signal source of TRIG IN connector.

c. GATE MODE

Check burst control(IC12 T-3570) and signal source of TRIG IN connector.

d. No SYMMETRY control works

Check integrator and comparator(IC10-12, Q26-28 T-3570).

e. No TRIG START LEVEL control works

VR2(T-3569) and associated circuit. See (2) a.

(4) Sweep

a. Confirm that the CW came out from the OUTPUT connector, also the frequency to be changed by rotating the FREQ dial

b. No sweep mode works

Check waveform at TP7(T-3570) for triangle wave which frequency is changed by rotate the TIME VARIABLE control.

Yes: Check waveform at pin 2 of P3(T-3570).

Yes- Tuning amplifier(IC1 T-3570) and associated circuit.

No Integrator and comparator(IC10-12, Q26-28 T-3570).

No: Check MODE switch and associated circuit.

c. Log sweep does not work

Check antilogarithmic converter(IC14-16 T-3570) and associated circuit

d. No sweep time changes

Check C1, 2(T-3569) and associated circuit.

(5) AM modulation

a. No modulated signal comes out

Check waveform at pin 2 of P3(T-3571) for CW and pin 1 of P5(T-3571) for associated signal from MOD IN connector.

Yes: Check waveform at base of Q12(T-3571) for modulated signal.

Yes- Check output amplifier(Q12-14 T-3571) and associated circuit.

No- Check IC3(T-3571) and associated circuit.

No: Check that the signal sources, MOD LEVEL control(VR5 T-3569) and associated circuit.

(6) Others

a. No SYNC output

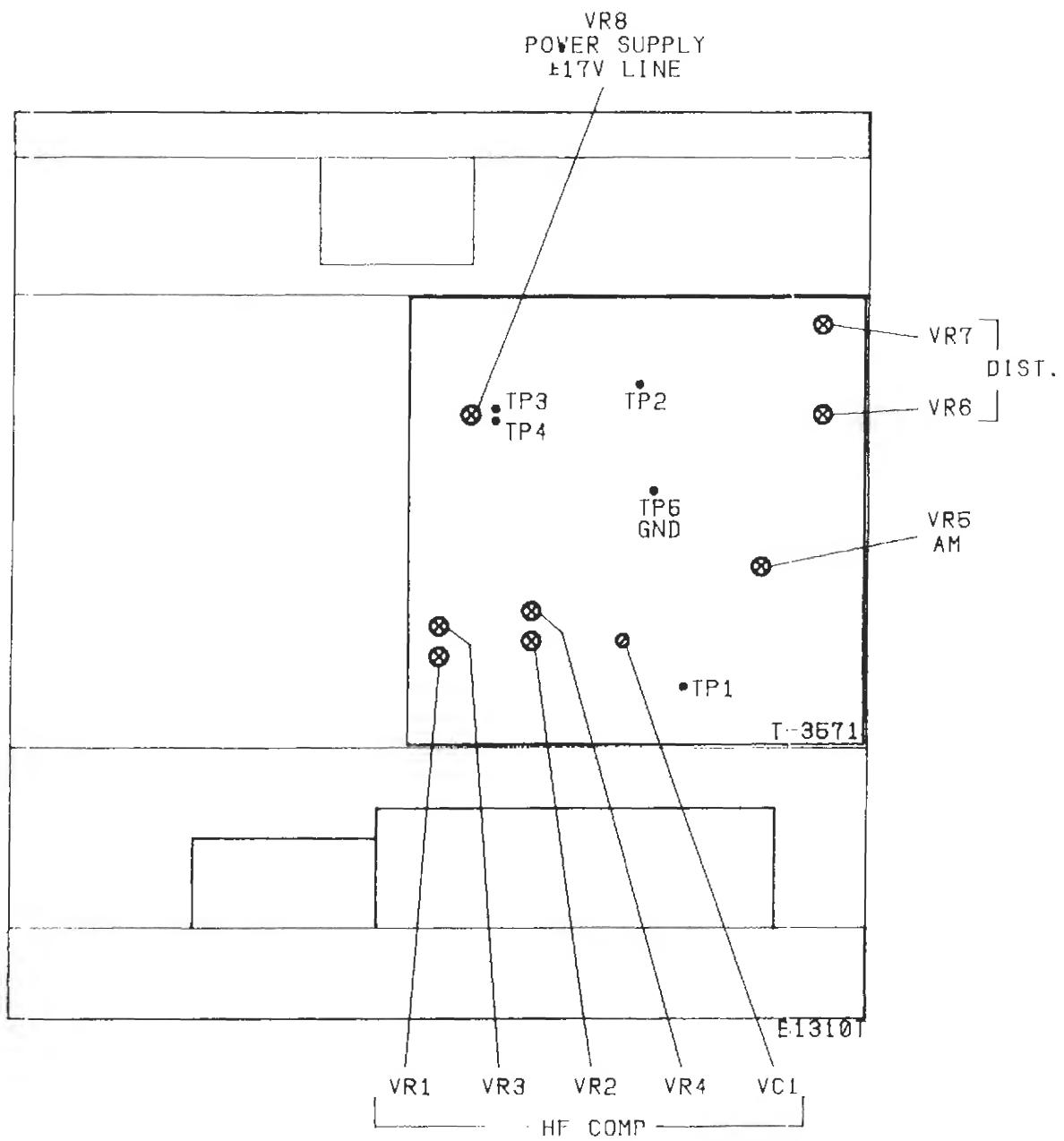
Check sync output amplifier(Q23-25 T-3570).

b. No SWEEP/BURST GATE OUT signal comes out

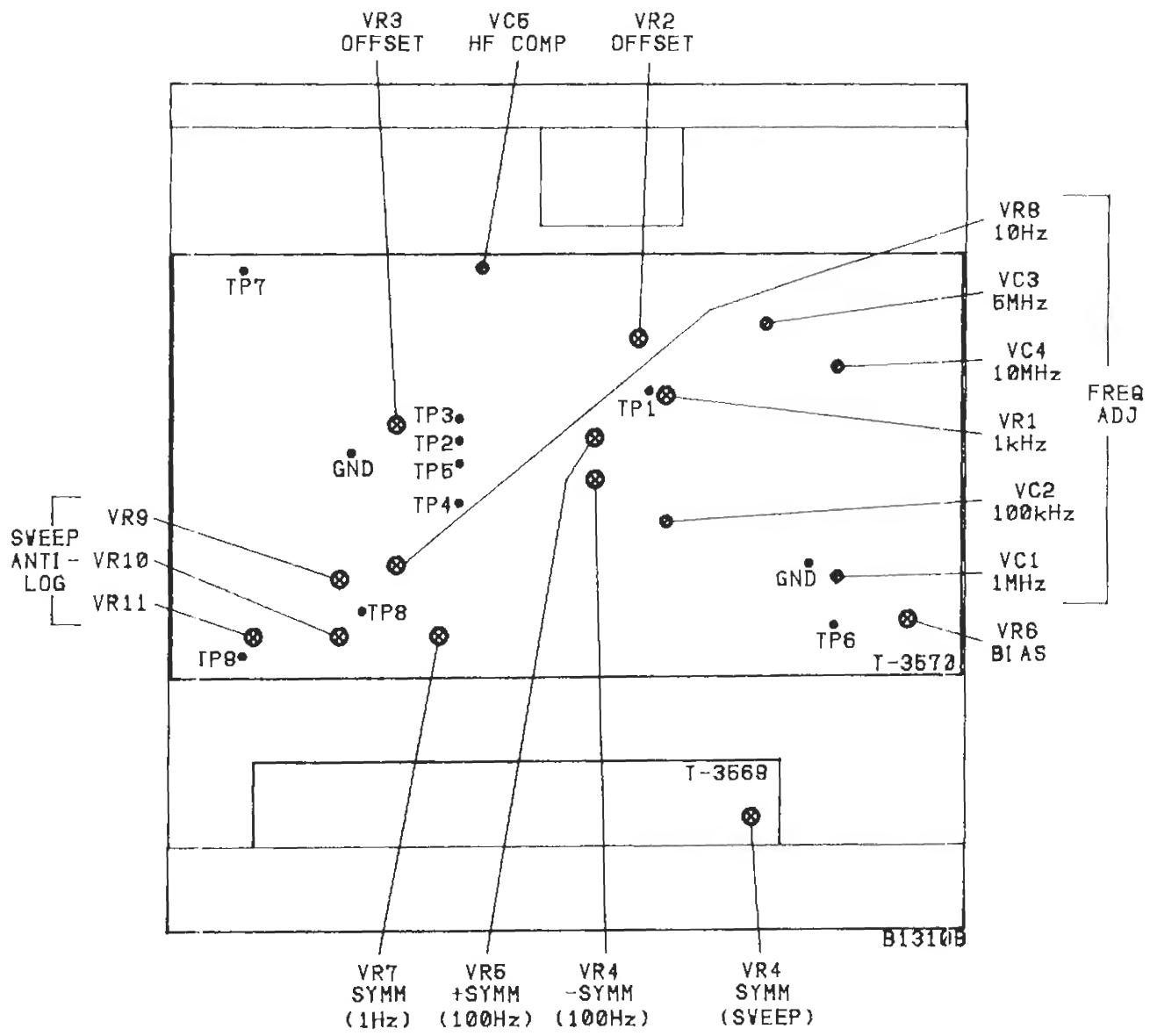
Check Q31(T-3570) and associated circuit.

## 5. ADJUSTMENT LOCATIONS

<TOP VIEW>

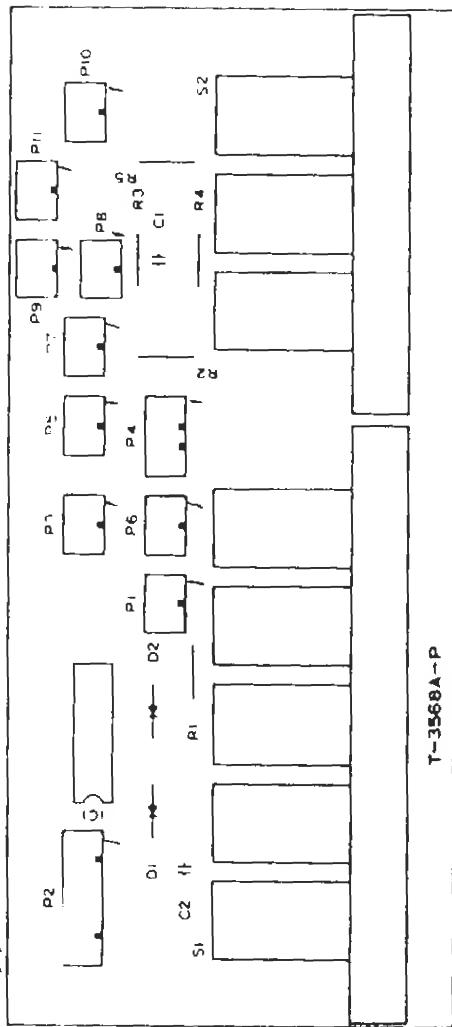


<BOTTOM VIEW>



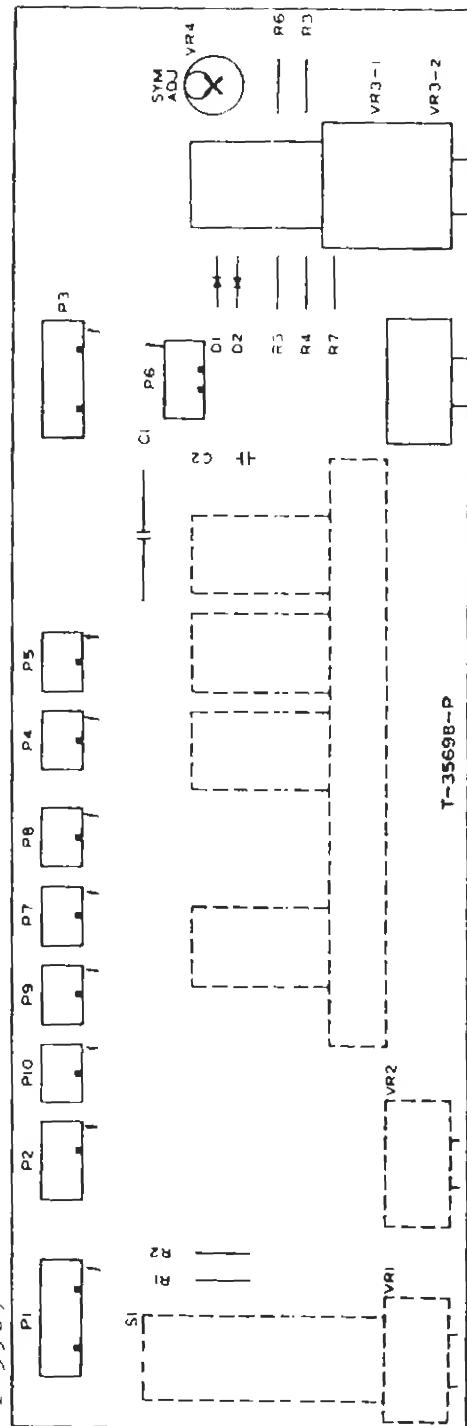
6. PRINTED CIRCUIT BOARD

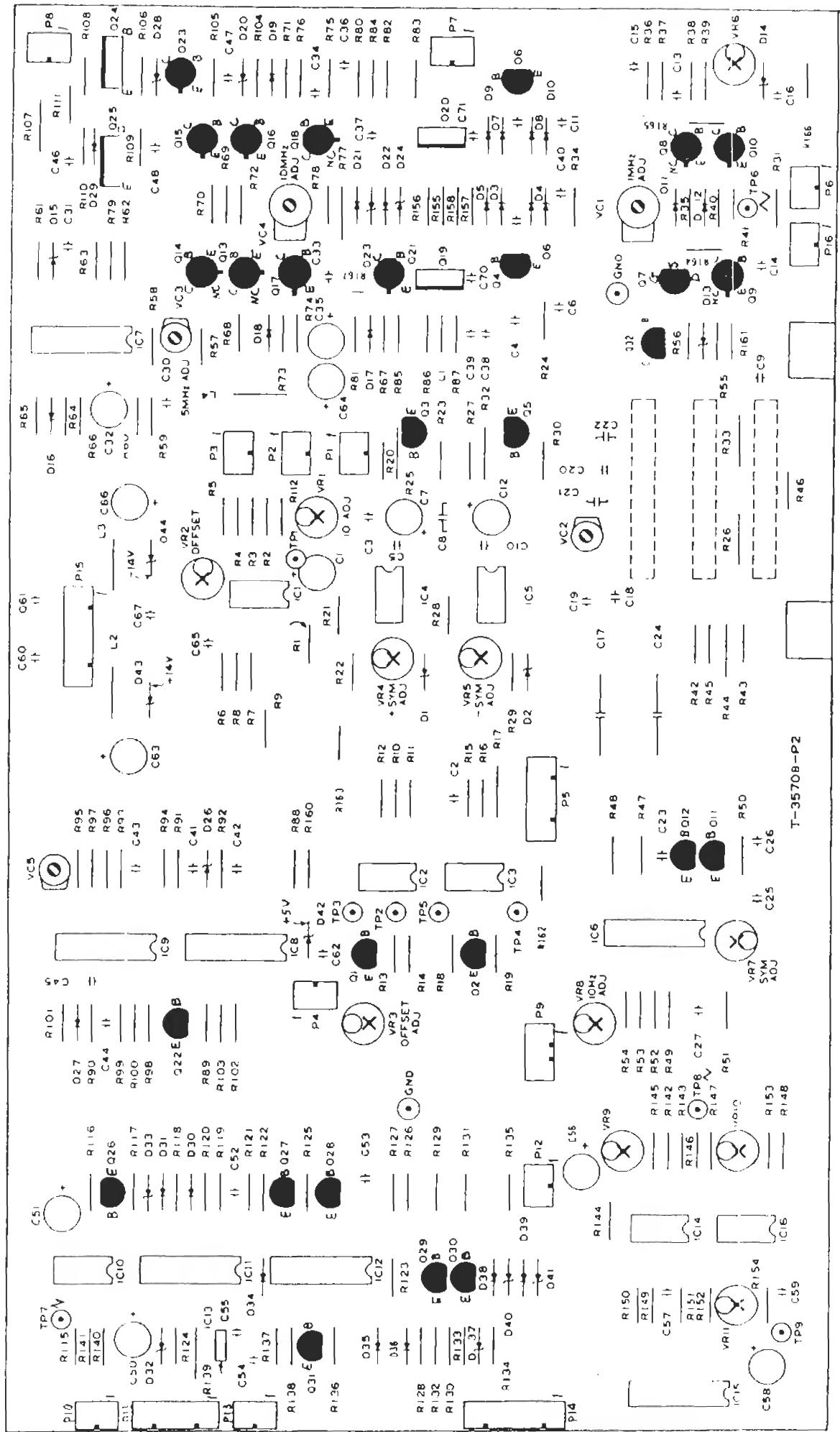
T-3568



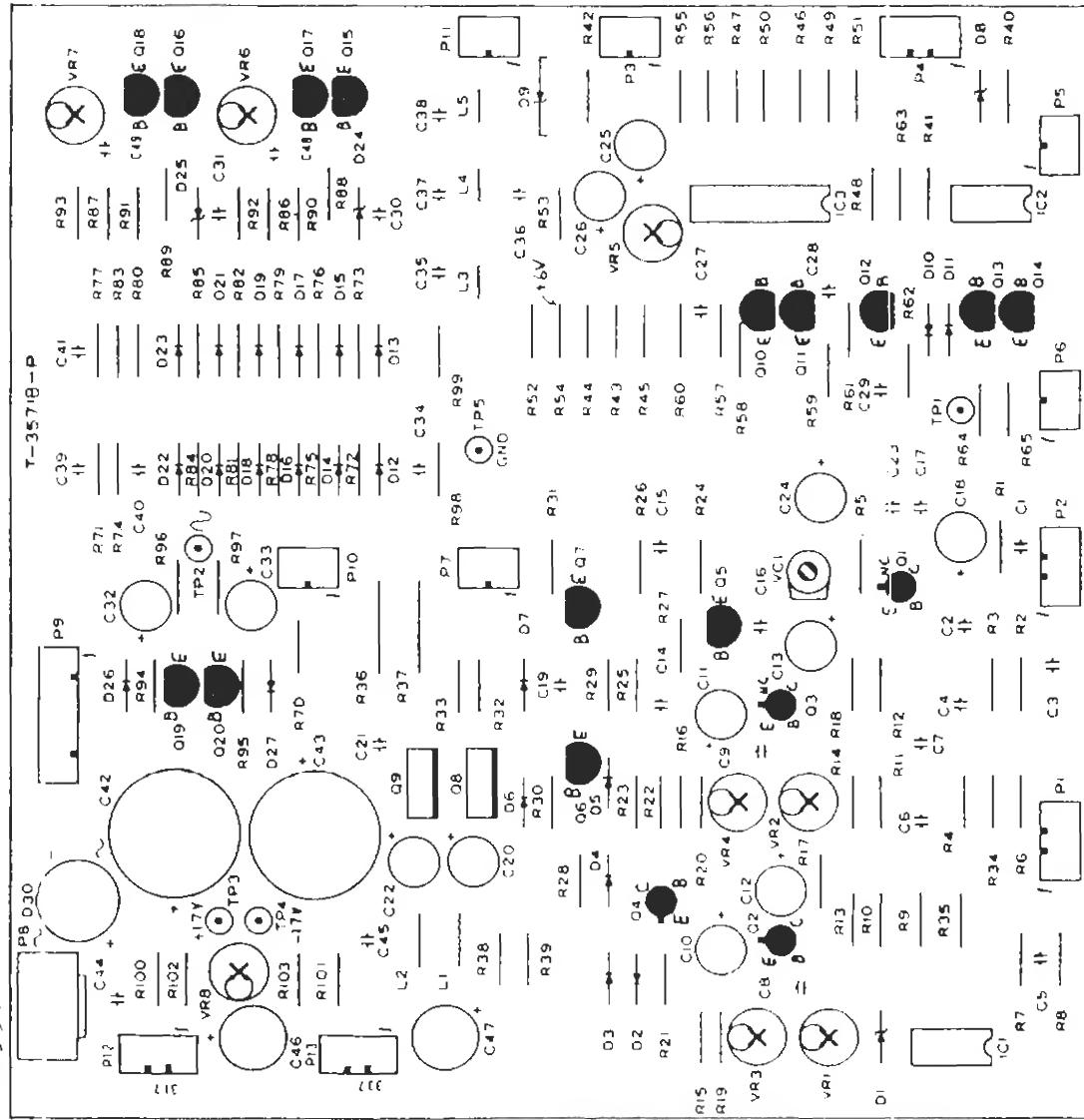
T-3568A-P

T-3569

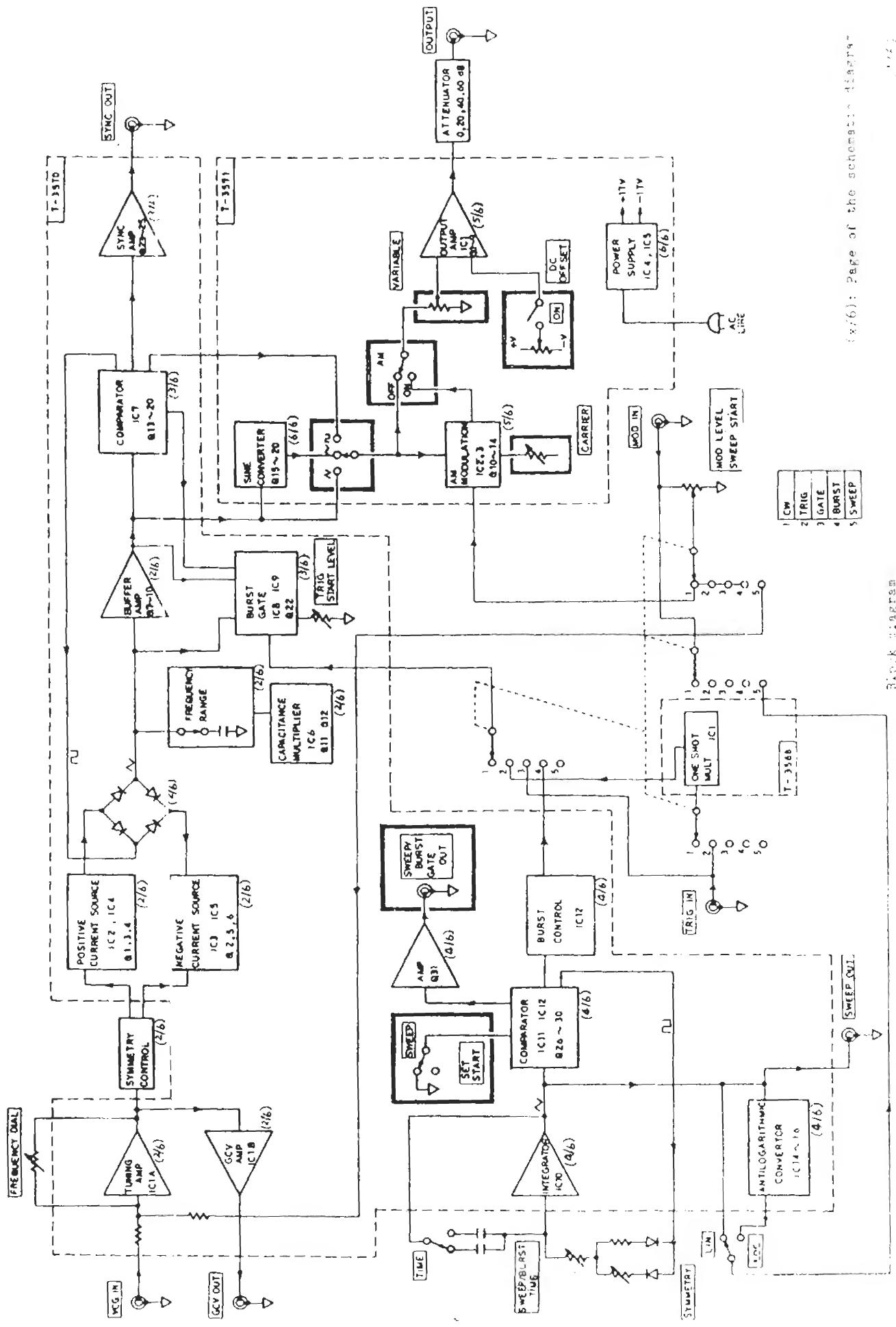


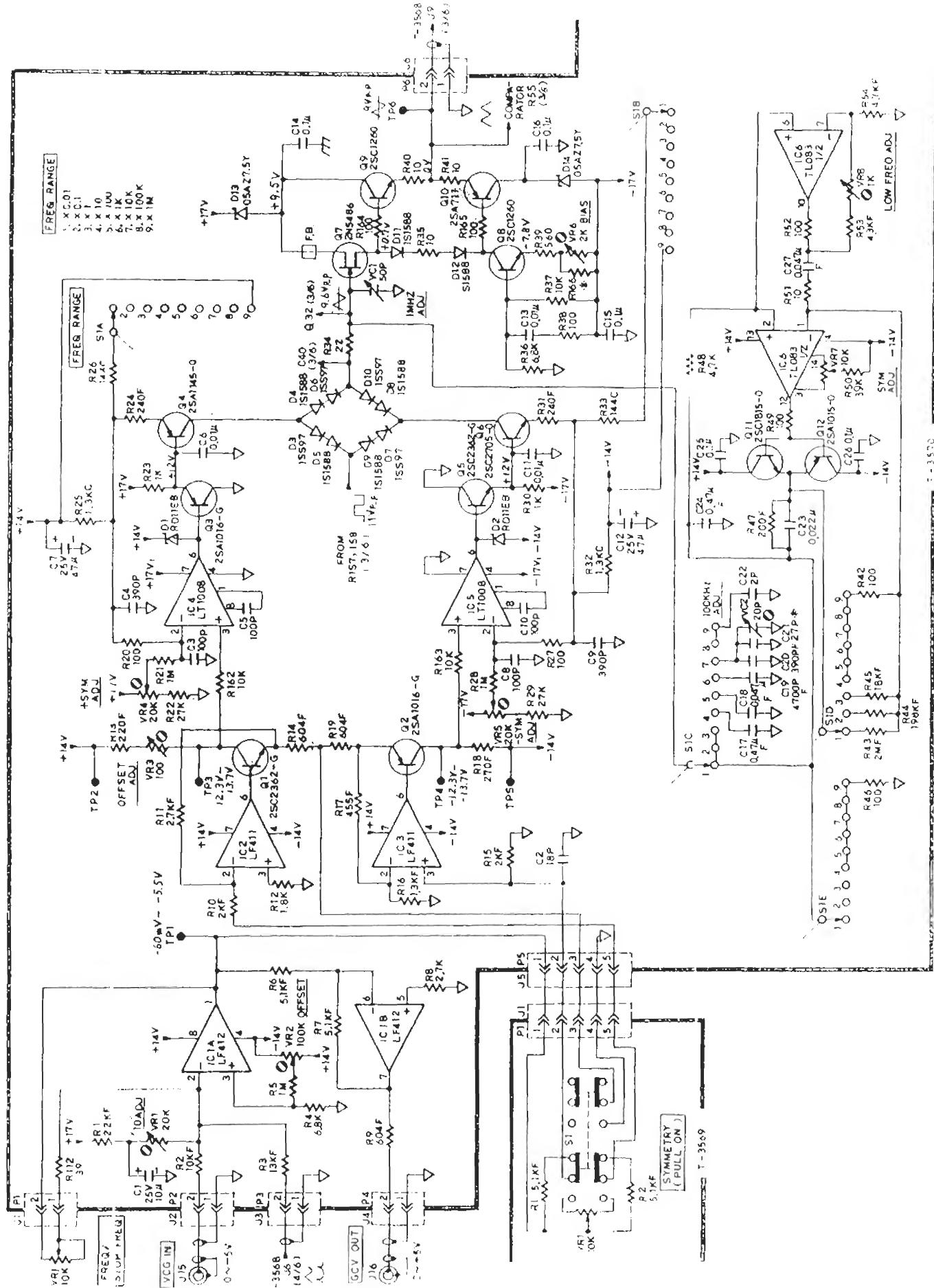


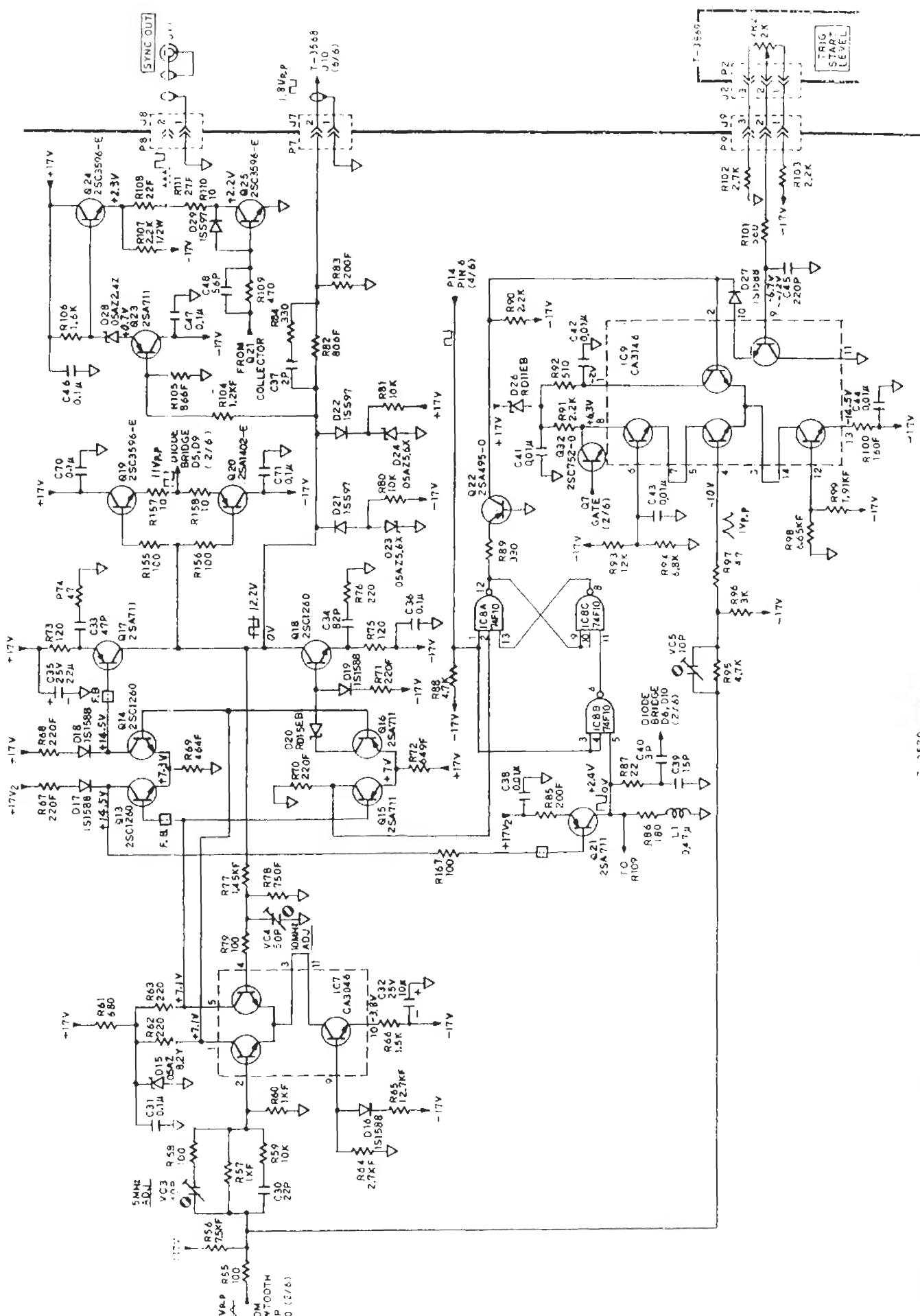
T-3571

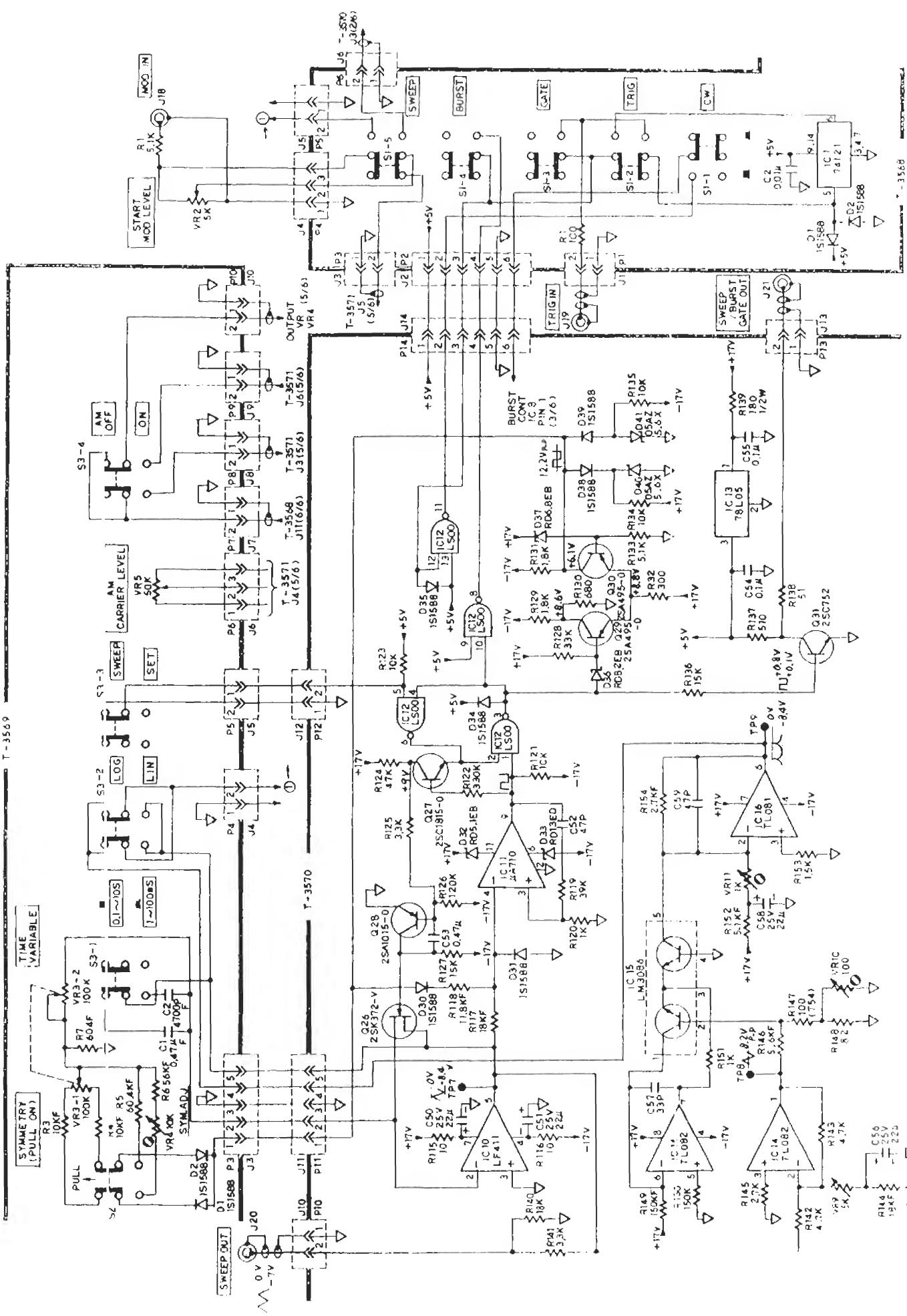


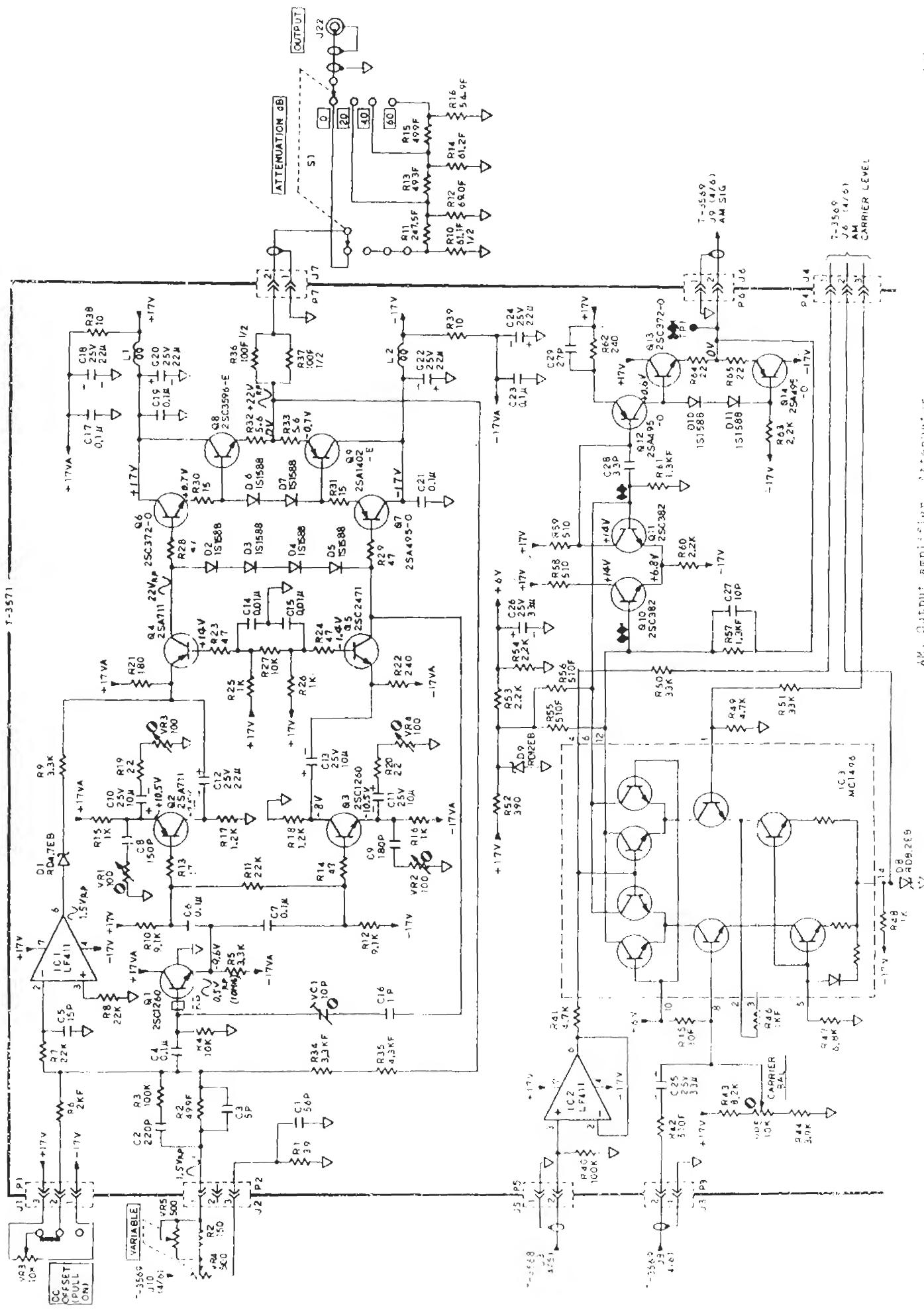
## 7. BLOCK DIAGRAM/SCHEMATIC DIAGRAM

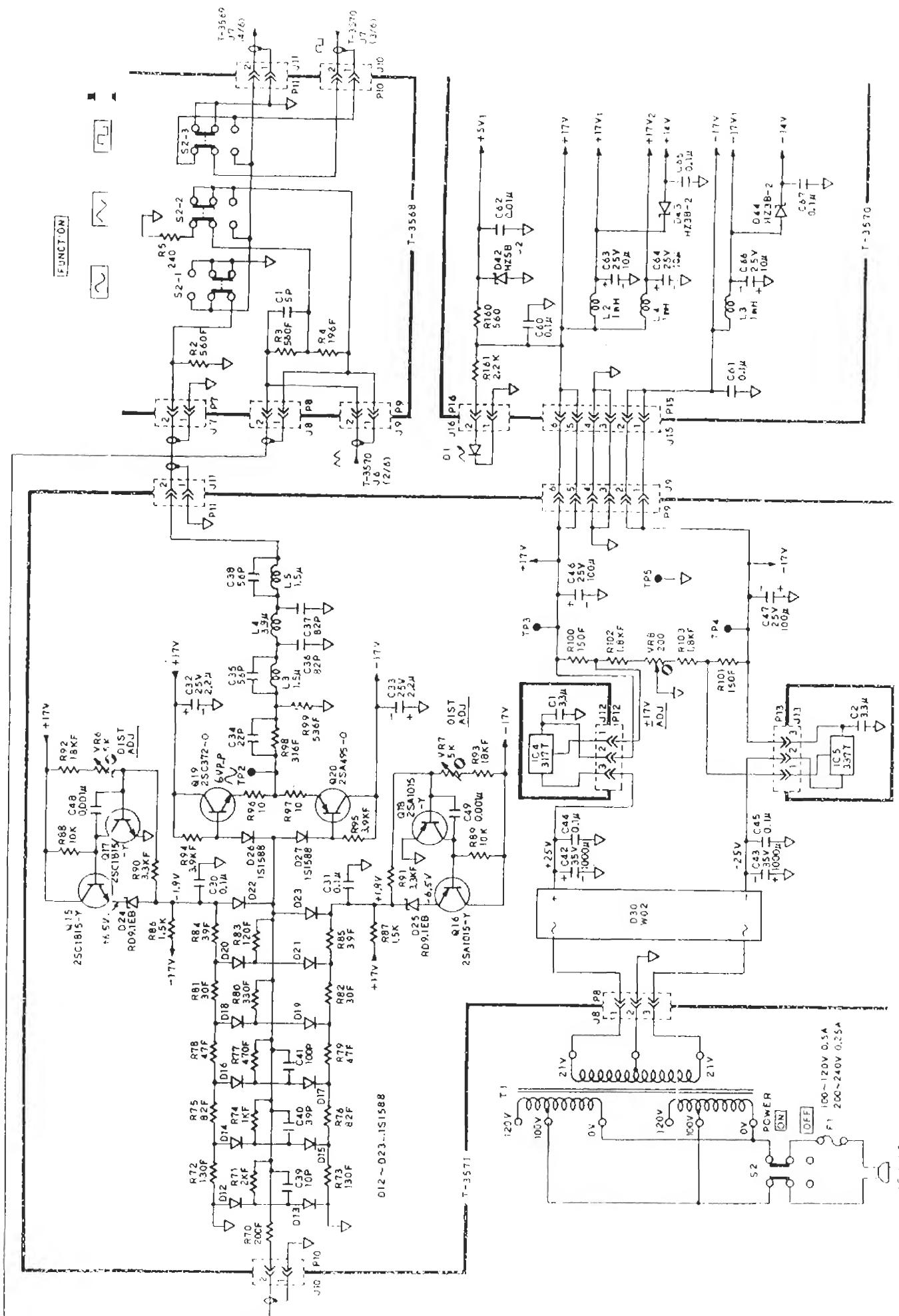












## No. LUR PT No. DESCRIPTION

## No LDR PT No. DESCRIPTION

*** MAIN FRAME ***		
R1	1010512003	CARBON FILM
R2	101051007	CARBON FILM
R10	1346119002	METAL FILM
R11	1362475004	METAL FILM
R12	1326919007	METAL FILM
R13	1324330006	METAL FILM
R14	1326129001	METAL FILM
R15	1314390007	METAL FILM
R16	1315459001	METAL FILM
-VARIABLE RESISTORS-		
VRI	1940464003	PLASTIC
VR2	1815008501	CARBON FILM
VR3	1815011115	CARBON FILM
-CAPACITORS-		
C1	2470339008	ELECTROLYTIC
C2	2470339008	ELECTROLYTIC
-DIODE-		
D1	313063000	LED
-INTEGRATED CIRCUITS-		
IC4	321017005	REGULATOR
IC5	3210337005	REGULATOR
-TRANSFORMER-		
T1	3800537004	TRANSFORMER
-SWITCHES-		
S1	4000536019	ROTARY
S2	4020138009	PUSH
-FUSE-		
F1	4363775007	TIME LAG
F1	4363750002	TIME LAG
-FUSIBLE LINKS-		
4310714006	CONNECTOR	BNC 186
4371060003	FUSE HÜLDER	FH-032(6 35x31,8)
*** CONTROL BOARD-1		
-RESISTORS-		
R1	1010101002	CARBON FILM
R2	1315600004	METAL FILM
R3	1315601004	METAL FILM
R4	1314660000	METAL FILM
R5	1010241008	CARBON FILM
-CAPACITORS-		
C1	2120050005	MICHA
C2	2010103005	CERAMIC
-SWITCHES-		
D1	3110006004	DETECTOR
D2	3110060004	DETECTOR
-INTEGRATED CIRCUIT-		
I1	3250121000	TTL
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
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S1	4000548004	PUSH
S2	4000549006	PUSH
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S1	4000548004	PUSH
S2	4000549006	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
S2	4000549006	PUSH
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S1	4000548004	PUSH
S2	4000549006	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
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-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
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S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	4000549006	PUSH
-PC BOARD-		
-SWITCHES-		
S1	4000548004	PUSH
S2	400054	

## No. LDR PT No. DESCRIPTION

## No. LDR PT No. DESCRIPTION

## \*\*\* MAIN BOARD

## -RESISTORS-

R1	1312402004	METAL FILM	2.2K	ΩHM
R2	1311102000	METAL FILM	10.0K	ΩHM
R3	1311320002	METAL FILM	1.3K	ΩHM
R4	1010682005	CARBON FILM	6.8K	ΩHM
R5	1010105000	CARBON FILM	1M	ΩHM
R6	1315101006	METAL FILM	5.1K	ΩHM
R7	1315101006	METAL FILM	5.1K	ΩHM
R8	10102272009	CARBON FILM	2.7K	ΩHM
R9	1316040008	METAL FILM	604	ΩHM
R10	1312001004	METAL FILM	2K	ΩHM
R11	1312701002	METAL FILM	2.7K	ΩHM
R12	1010182008	CARBON FILM	1.8K	ΩHM
R13	1312200000	METAL FILM	220	ΩHM
R14	1316040008	METAL FILM	604	ΩHM
R15	1312001004	METAL FILM	2K	ΩHM
R16	1311301000	METAL FILM	1.3K	ΩHM
R17	1324550006	METAL FILM	455	ΩHM
R18	1312700000	METAL FILM	270	ΩHM
R19	1316040008	METAL FILM	604	ΩHM
R20	1010101002	CARBON FILM	100	ΩHM
R21	1010105000	CARBON FILM	1M	ΩHM
R22	10102272001	CARBON FILM	27K	ΩHM
R23	1010102004	CARBON FILM	1K	ΩHM
R24	1312400008	METAL FILM	240	ΩHM
R25	1312005005	METAL FILM	1.3K	ΩHM
R26	1384500062	METAL FILM	1.44	ΩHM
R27	1010101002	CARBON FILM	100	ΩHM
R28	1010105009	CARBON FILM	1M	ΩHM
R29	10102273001	CARBON FILM	27K	ΩHM
R30	1010102004	CARBON FILM	1K	ΩHM
R31	1312400008	METAL FILM	240	ΩHM
R32	1381005005	METAL FILM	1.3K	ΩHM
R33	1384500062	METAL FILM	1.44	ΩHM
R34	1010220000	CARBON FILM	22	ΩHM
R35	1010100000	CARBON FILM	10	ΩHM
R36	1010682008	CARBON FILM	6.8K	ΩHM
R37	1010103006	CARBON FILM	10K	ΩHM
R38	1010101002	CARBON FILM	100	ΩHM
R39	1010561006	CARBON FILM	560	ΩHM
R40	1010100010	CARBON FILM	10	ΩHM
R41	1010101010	CARBON FILM	10	ΩHM
R42	1312000062	CARBON FILM	200	ΩHM
R43	1312004000	METAL FILM	4.7K	ΩHM
R44	1321933005	METAL FILM	198K	ΩHM
R45	1311302002	CARBON FILM	18K	ΩHM
R46	1010101002	CARBON FILM	100	ΩHM
R47	1312000062	METAL FILM	200	ΩHM
R48	1010472017	CARBON FILM	4.7K	ΩHM
R49	1010101012	CARBON FILM	100	ΩHM
R50	1010393001	CARBON FILM	39K	ΩHM
R51	1010100010	CARBON FILM	10	ΩHM
R52	1010101012	CARBON FILM	100	ΩHM
R53	1314301008	METAL FILM	3K	ΩHM
R54	1314701004	METAL FILM	4.7K	ΩHM
R55	1010101012	CARBON FILM	100	ΩHM

## No. LDR PT No. DESCRIPTION

T-3570 CONT'D				
R56	1317501004	METAL FILM	7	ΩHM
R57	1311001008	METAL FILM	1K	ΩHM
R58	1010101002	CARBON FILM	100	ΩHM
R59	1010103006	METAL FILM	10K	ΩHM
R60	1311001008	CARBON FILM	100	ΩHM
R61	1010681006	CARBON FILM	680	ΩHM
R62	1010221002	CARBON FILM	220	ΩHM
R63	1010221002	CARBON FILM	220	ΩHM
R64	1314201002	METAL FILM	2.7K	ΩHM
R65	131272009	METAL FILM	12.7K	ΩHM
R66	1010152009	CARBON FILM	1.5K	ΩHM
R67	1312200000	METAL FILM	220	ΩHM
R68	1312200000	METAL FILM	220	ΩHM
R69	1314640000	METAL FILM	464	ΩHM
R70	1312200000	METAL FILM	220	ΩHM
R71	1312200060	METAL FILM	220	ΩHM
R72	1316490009	METAL FILM	649	ΩHM
R73	1010121008	CARBON FILM	120	ΩHM
R74	1010470003	CARBON FILM	47	ΩHM
R75	1010121008	CARBON FILM	120	ΩHM
R76	1010221002	CARBON FILM	220	ΩHM
R77	1322451005	METAL FILM	45K	ΩHM
R78	1317500002	METAL FILM	750	ΩHM
R79	1010101002	CARBON FILM	100	ΩHM
R80	1010103006	CARBON FILM	10K	ΩHM
R81	1010103006	CARBON FILM	10K	ΩHM
R82	1318060006	METAL FILM	806	ΩHM
R83	1312000002	METAL FILM	200	ΩHM
R84	1010331009	CARBON FILM	330	ΩHM
R85	1312000002	METAL FILM	200	ΩHM
R86	1010181006	CARBON FILM	180	ΩHM
R87	1010220000	CARBON FILM	220	ΩHM
R88	1010472007	CARBON FILM	47K	ΩHM
R89	1010331009	CARBON FILM	330	ΩHM
R90	1010222004	CARBON FILM	22K	ΩHM
R91	1010322004	CARBON FILM	2.2K	ΩHM
R92	1010511001	CARBON FILM	510	ΩHM
R93	1010123002	CARBON FILM	12K	ΩHM
R94	1010682008	CARBON FILM	6.8K	ΩHM
R95	1010472007	CARBON FILM	4.7K	ΩHM
R96	1010302002	CARBON FILM	3K	ΩHM
R97	1010470003	CARBON FILM	47	ΩHM
R98	1316510007	METAL FILM	65K	ΩHM
R99	1311911007	METAL FILM	1.31K	ΩHM
R100	1311600000	METAL FILM	160	ΩHM
R101	1010306006	CARBON FILM	560	ΩHM
R102	1010222005	CARBON FILM	52	ΩHM
R103	1010222004	METAL FILM	2.2K	ΩHM
R104	1311201006	METAL FILM	1.2K	ΩHM
R105	1318660000	METAL FILM	866	ΩHM
R106	1010162002	CARBON FILM	1.6K	ΩHM
R107	1010222001	CARBON FILM	2.7K	ΩHM
R108	1312200008	METAL FILM	2.2K	ΩHM
R109	1010471005	CARBON FILM	470	ΩHM
R110	1010100000	CARBON FILM	10	ΩHM
R111	1312700008	METAL FILM	27	ΩHM
R112	1010390005	CARBON FILM	39	ΩHM

## No. LDR PT No. DESCRIPTION

## No. LDR PT No. DESCRIPTION

## CJ-3570 CQHT-D

R115	1010100000	CARBON FILM	10 OHM	1/4W
R116	1010100000	CARBON FILM	10 OHM	1/4W
R117	1311802002	METAL FILM	18K OHM	1/4W
R118	1311820008	METAL FILM	11.8K OHM	1/4W
R119	1010393001	CARBON FILM	35K OHM	1/4W
R120	1010102004	CARBON FILM	1K OHM	1/4W
R121	1010102004	CARBON FILM	1.5K OHM	1/4W
R122	10101334005	CARBON FILM	330K OHM	1/4W
R123	1010103006	CARBON FILM	1.0K OHM	1/4W
R124	1010103009	CARBON FILM	47K OHM	1/4W
R125	1010333003	CARBON FILM	33K OHM	1/4W
R126	1010124004	CARBON FILM	120K OHM	1/4W
R127	1010153001	CARBON FILM	15K OHM	1/4W
R128	1010333003	CARBON FILM	33K OHM	1/4W
R129	1010182008	CARBON FILM	1.8K OHM	1/4W
R130	1010581006	CARBON FILM	680 OHM	1/4W
R131	1010182008	CARBON FILM	1.8K OHM	1/4W
R132	10101361000	CARBON FILM	300 OHM	1/4W
R133	1010512003	CARBON FILM	5.1K OHM	1/4W
R134	1010103006	CARBON FILM	1.0K OHM	1/4W
R135	1010103006	CARBON FILM	1.0K OHM	1/4W
R136	1010153001	CARBON FILM	15K OHM	1/4W
R137	10101511001	CARBON FILM	51.0 OHM	1/4W
R138	1010510009	CARBON FILM	51.0 OHM	1/4W
R139	102010181003	CARBON FILM	180 OHM	1/2W
R140	1010183000	CARBON FILM	18K OHM	1/4W
R141	1010532001	CARBON FILM	3.3K OHM	1/4W
R142	1010472007	CARBON FILM	4.7K OHM	1/4W
R143	1010472007	CARBON FILM	4.7K OHM	1/4W
R144	1010472009	METAL FILM	18K OHM	1/4W
R145	1010472009	CARBON FILM	2.7K OHM	1/4W
R146	12329501006	METAL FILM	5.6K OHM	1/4W
R147	12329502937	METAL FILM	100 OHM	1/4W
R148	10106220004	CARBON FILM	32 OHM	1/4W
R149	1211503002	METAL FILM	15K OHM	1/4W
R150	1010154003	CARBON FILM	15K OHM	1/4W
R151	1010102004	CARBON FILM	1K OHM	1/4W
R152	1311501006	METAL FILM	5.1K OHM	1/4W
R153	1010152009	CARBON FILM	1.8K OHM	1/4W
R154	13112701002	METAL FILM	2.7K OHM	1/4W
R155	1010101002	CARBON FILM	100 OHM	1/4W
R156	1010101002	CARBON FILM	100 OHM	1/4W
R157	1010100006	CARBON FILM	10 OHM	1/4W
R158	1010100006	CARBON FILM	56.0 OHM	1/4W
R159	1010561006	CARBON FILM	2.2K OHM	1/4W
R160	1010222004	CARBON FILM	1.0K OHM	1/4W
R161	1010103006	CARBON FILM	1.0K OHM	1/4W
R162	1010103006	CARBON FILM	1.0K OHM	1/4W
R163	1010103006	CARBON FILM	1.0K OHM	1/4W
R164	1010101002	CARBON FILM	1.0K OHM	1/4W
R165	1010101002	CARBON FILM	1.0K OHM	1/4W
R166	1000610005	CARBON FILM	1.0K OHM	1/4W
R167	1000610005	CARBON FILM	1.0K OHM	1/4W

## VARIABLE RESISTORS-

V1	12110040088	CERMET	20K OHM	20%
V2	12110040087	CERMET	100K OHM	20%
V3	13401430069	METAL FILM	100 OHM	20%
V4	1340145001	METAL FILM	20K OHM	20%

CJ-3570 (CONT'D)		DESCRIPTION		
VR5	1940015001	METAL FILM	20K OHM	20%
VR6	12110040051	CERMET	2K OHM	20%
VR7	12110040079	CERMET	1K OHM	20%
VR8	12110040042	CERMET	1K OHM	20%
VR9	1211004125	CERMET	5K OHM	20%
VR10	12110040066	CERMET	100K OHM	20%
VR11	12110040042	CERMET	1K OHM	20%
-CAPACITORS-		DESCRIPTION		
C1	2240100006	ELECTROLYTIC	1.0uF	20%
C2	2120180008	MICA	1.0pF	1.0%
C3	2110101009	MICA	1.00pF	1.0%
C4	2130391008	PLASTIC FILM	390pF	20%
C5	2110101009	MICA	1.00pF	5.0%
C6	2010103005	CERAMIC	0.10uF	5.0%
C7	2240470009	ELECTROLYTIC	47uF	20%
C8	2110101009	MICA	100uF	1.0%
C9	2130391008	PLASTIC FILM	390pF	5.0%
C10	2110101009	MICA	1.00uF	1.0%
C11	2010103005	CERAMIC	0.10uF	5.0%
C12	2240470009	ELECTROLYTIC	47uF	20%
C13	2010103005	CERAMIC	0.11uF	5.0%
C14	2130391006	CERAMIC	0.11uF	5.0%
C15	20905016006	CERAMIC	0.11uF	5.0%
C16	20905016006	CERAMIC	0.11uF	5.0%
C17	2140022003	PLASTIC FILM	0.47uF	12
C18	2192031002	PLASTIC FILM	0.47uF	12
C19	2192031002	PLASTIC FILM	470pF	12
C20	2192030000	PLASTIC FILM	390pF	12
C21	2120270009	MICA	27pF	5.0%
C22	21600220006	MICA	22pF	5.0%
C23	2610223003	PLASTIC FILM	0.022uF	12
C24	2130022003	PLASTIC FILM	0.47uF	12
C25	20905016006	CERAMIC	0.11uF	5.0%
C26	20905016006	CERAMIC	0.11uF	5.0%
C27	2152031002	PLASTIC FILM	0.47uF	12
C28	2120220004	MICA	22pF	5.0%
C29	20905016006	CERAMIC	0.11uF	5.0%
C30	2240470016	ELECTROLYTIC	47uF	12
C31	2120310006	MICA	3pF	1.0%
C32	2120310006	MICA	3pF	1.0%
C33	2120310006	MICA	3pF	1.0%
C34	2120820008	MICA	3.2pF	1.0%
C35	2240220006	ELECTROLYTIC	22uF	20%
C36	20905016006	CERAMIC	0.11uF	5.0%
C37	2120220006	MICA	2.2pF	20%
C38	2010103005	CERAMIC	0.01uF	1.0%
C39	2120150009	MICA	3pF	1.0%
C40	2120303009	MICA	3pF	1.0%
C41	2010103005	CERAMIC	0.01uF	5.0%
C42	2010103005	CERAMIC	0.01uF	5.0%
C43	2010103005	CERAMIC	0.01uF	5.0%
C44	2010103005	CERAMIC	0.01uF	5.0%
C45	2110221009	MICA	22pF	1.0%
C46	2090016006	CERAMIC	0.11uF	5.0%
C47	2090616006	CERAMIC	0.11uF	5.0%
C48	2120560009	MICA	5.6pF	1.0%
C49	2240220006	ELECTROLYTIC	2.2uF	20%
C50	2240220006	ELECTROLYTIC	2.2uF	20%

## No. LDR PT No. DESCRIPTION

## No. LDR PT No. DESCRIPTION

No.	LDR PT No.	DESCRIPTION	No.	LDR PT No.	DESCRIPTION
CT-3570	CONT D		CT-3570	CONT D	
C52	2040420016	MICA	931	3030752005	NPN
C53	2610470008	PLASTIC FILM	932	3030752005	NPN
C54	2090016008	CERAMIC			
C55	2090016006	CERAMIC			
C56	2240220006	CERAMIC			
C57	2120330001	CERAMIC			
C58	2240220008	CERAMIC			
C59	2120470016	CERAMIC			
C60	2090016006	CERAMIC			
C61	2050016006	CERAMIC			
C62	2010103005	CERAMIC			
C63	2240100006	ELECTROLYTIC			
C64	2240100008	ELECTROLYTIC			
C65	2090016006	CERAMIC			
C66	2240100006	ELECTROLYTIC			
C67	2090016006	CERAMIC			
C70	2090016006	CERAMIC			
C71	2090016006	CERAMIC			
- VARIABLE CAPACITORS -					
VC1	2910023009	CERAMIC	5-50PF	250V	ZENER
VC2	2910020003	CERAMIC	3-18PF	250V	ZENER
VC3	2910022007	CERAMIC	4-40PF	250V	ZENER
VC4	2310023009	CERAMIC	5-50PF	250V	ZENER
VC5	2910018006	CERAMIC	2-8-10PF	250V	ZENER
- TRANSISTORS -					
Q1	3032362004	NPN			
Q1	3090035001	FET			
Q1	3011010005	FET			
Q2	3011016005	FET			
Q3	3011145006	FET			
Q4	3032362004	NPN			
Q5	30322705008	NPN			
Q6	3031260008	NPN			
Q7	3031260009	NPN			
Q8	3031260009	NPN			
Q9	3010711007	FET			
Q10	3031815-0	or			
Q11	3031815-0	or			
Q12	3011015003	FET			
Q13	2031260000	NPN			
Q14	3031260000	NPN			
Q15	3010711007	FET			
Q16	3010711007	FET			
Q17	3010711007	FET			
Q18	3031260006	NPN			
Q19	3033546015	NPN			
Q20	3011402000	FET			
Q21	3010711007	FET			
Q22	3010495007	FET			
Q23	3033546005	NPN			
Q24	3033546005	NPN			
Q25	3050372003	FET			
Q27	3031815-0	or			
Q28	30105063	or			
Q29	3010495007	FET			
Q30	3010495007	FET			
- INTEGRATED CIRCUITS -					
IC1	3220075000	OP AMP			
IC2	3220075008	OP AMP			
IC3	3220075008	OP AMP			
IC4	3220147007	OP AMP			
IC5	3220147007	OP AMP			
IC6	2220146005	OP AMP			
IC7	30506034007	TRANSISTOR ARRAY			
IC8	3220010009	TTL			
	74F10	IC			

## No. LDR PT No. DESCRIPTION

## No. LDR PT No.

## DESCRIPTION

(T-3570 CONT'D)

R19 3090035005 TRANSISTOR ARRAY U3146 E  
LF411 UP AMP  
LINEAR 5N72710N  
TTL 74LS00  
UPC78LUS +5V  
REGULATOR  
UP AMP  
TL082  
TRANSISTOR  
UP AMP  
TL082  
TRANSISTOR  
UP AMP  
TL082CP

-COILS-  
L1 3960109104 COIL 0.47uH 10V  
L2 3960109104 COIL 1mH 10V  
L3 3960109104 COIL 1mH 10V  
L4 3960109003 COIL 1uH 10V

-SWITCH- 31 4000545008 ROTARY

-PC BOARD- 5903570024

-MISCELLANEOUS- 4323019021 SOCKET

310-39-120

7-3570B

FREQ RANGE:

3-545

CONT'D)

\*\*\* POWER SUPPLY, AMPLIFIER BOARD T-3571

-RESISTORS-

R1 1010390005 CARBON FILM 73 OHM 5% 1/4W  
R2 1314990007 METAL FILM 479 OHM 1% 1/4W  
R3 1010104008 CARBON FILM 10K OHM 5% 1/4W  
R4 1010103006 CARBON FILM 10K OHM 5% 1/4W  
R5 1010320011 CARBON FILM 3.3K OHM 5% 1/4W  
R6 1311202003 METAL FILM 1.2K OHM 1% 1/4W  
R7 1010223006 CARBON FILM 22K OHM 5% 1/4W  
R8 1010223005 CARBON FILM 22K OHM 5% 1/4W  
R9 1010320011 CARBON FILM 3.3K OHM 5% 1/4W  
R10 1010320029 CARBON FILM 9.1K OHM 5% 1/4W  
R11 1010223006 CARBON FILM 22K OHM 5% 1/4W  
R12 1010320009 CARBON FILM 3.1K OHM 5% 1/4W  
R13 1010470003 CARBON FILM 47 OHM 5% 1/4W  
R14 1010476003 CARBON FILM 47 OHM 5% 1/4W  
R15 1010162004 CARBON FILM 1K OHM 5% 1/4W  
R16 1010102004 CARBON FILM 1.2K OHM 5% 1/4W  
R17 1010122006 CARBON FILM 1.2K OHM 5% 1/4W  
R18 1010122000 CARBON FILM 22 OHM 5% 1/4W  
R19 1010220000 CARBON FILM 22 OHM 5% 1/4W  
R20 1010220000 CARBON FILM 22 OHM 5% 1/4W  
R21 1010181006 CARBON FILM 1.8K OHM 5% 1/4W  
R22 1010241006 CARBON FILM 440 OHM 5% 1/4W  
R23 1010470003 CARBON FILM 47 OHM 5% 1/4W  
R24 1010470002 CARBON FILM 47 OHM 5% 1/4W  
R25 1010102004 CARBON FILM 1K OHM 5% 1/4W  
R26 1010102004 CARBON FILM 1K OHM 5% 1/4W  
R27 1010102004 CARBON FILM 1K OHM 5% 1/4W  
R28 1010103006 CARBON FILM 10K OHM 5% 1/4W  
R29 1010470003 CARBON FILM 1.3K OHM 5% 1/4W  
R30 1010390002 CARBON FILM 13133000000 5% 1/4W  
R31 1010510005 CARBON FILM 1010510001 5% 1/4W  
R32 1010569002 CARBON FILM 1010569002 5% 1/4W  
R33 1010569002 CARBON FILM 1010569002 5% 1/4W  
R34 1010569002 METAL FILM 1010569002 5% 1/4W  
R35 1014301008 METAL FILM 1014301008 5% 1/4W  
R36 1010000000 METAL FILM 1010000000 5% 1/4W  
R37 1010100000 METAL FILM 1010100000 5% 1/4W  
R38 1010100000 CARBON FILM 1010100000 5% 1/4W  
R39 1010100000 CARBON FILM 1010100000 5% 1/4W  
R40 1010104008 CARBON FILM 1010104008 5% 1/4W  
R41 1010472007 CARBON FILM 1010472007 5% 1/4W  
R42 1315100004 CARBON FILM 1010822008 5% 1/4W  
R43 1010392009 CARBON FILM 1010392009 5% 1/4W  
R44 10103330033 CARBON FILM 10103330033 5% 1/4W  
R45 10103330033 METAL FILM 10103330033 5% 1/4W  
R46 1011001008 CARBON FILM 1010682008 5% 1/4W  
R47 1010682008 CARBON FILM 1010682008 5% 1/4W  
R48 1010102004 CARBON FILM 1010102004 5% 1/4W  
R49 1010472007 CARBON FILM 1010472007 5% 1/4W  
R50 10103330033 CARBON FILM 10103330033 5% 1/4W  
R51 1010391007 CARBON FILM 1010391007 5% 1/4W  
R52 1010222004 CARBON FILM 1010222004 5% 1/4W  
R53 1010222004 CARBON FILM 1010222004 5% 1/4W  
R54 1010222004 CARBON FILM 1010222004 5% 1/4W  
R55 1015100004 CARBON FILM 1015100004 5% 1/4W  
R56 1015100004 METAL FILM 1015100004 5% 1/4W  
R57 1311301000 METAL FILM 1010510001 5% 1/4W  
R58 1010510001 CARBON FILM 1010510001 5% 1/4W  
R59 1010222004 CARBON FILM 1010222004 5% 1/4W  
R60 1010222004 CARBON FILM 1010222004 5% 1/4W  
R61 1311391000 METAL FILM 1010241008 5% 1/4W  
R62 1010241008 CARBON FILM 1010241008 5% 1/4W  
R63 1010222004 CARBON FILM 1010222004 5% 1/4W  
R64 1010220000 CARBON FILM 1010220000 5% 1/4W  
R65 1010220000 CARBON FILM 1010220000 5% 1/4W  
R66 1010220002 METAL FILM 1010220002 5% 1/4W  
R67 1312001004 METAL FILM 1010220004 5% 1/4W  
R68 1312001004 METAL FILM 1010220004 5% 1/4W  
R69 1311300008 METAL FILM 1010220008 5% 1/4W  
R70 1311300008 METAL FILM 1010220008 5% 1/4W  
R71 1311300008 METAL FILM 1010220008 5% 1/4W  
R72 1311300008 METAL FILM 1010220008 5% 1/4W  
R73 1311300008 METAL FILM 1010220008 5% 1/4W  
R74 1311300008 METAL FILM 1010220008 5% 1/4W  
R75 1318209004 METAL FILM 1010220004 5% 1/4W  
R76 1318209004 METAL FILM 1010220004 5% 1/4W  
R77 1314700002 METAL FILM 1010220002 5% 1/4W  
R78 1314700002 METAL FILM 1010220002 5% 1/4W  
R79 1314709000 METAL FILM 1010220000 5% 1/4W  
R80 1313300000 METAL FILM 1010220000 5% 1/4W  
R81 1313009006 METAL FILM 1010220006 5% 1/4W  
R82 1313009006 METAL FILM 1010220006 5% 1/4W  
R83 1311200004 METAL FILM 1010220004 5% 1/4W  
R84 131139090002 METAL FILM 1010220000 5% 1/4W  
R85 1313909002 METAL FILM 1010220002 5% 1/4W  
R86 1010152005 CARBON FILM 1010152005 5% 1/4W  
R87 1010152005 CARBON FILM 1010152005 5% 1/4W  
R88 1019103666 CARBON FILM 1019103666 5% 1/4W  
R89 1010103006 CARBON FILM 1010103006 5% 1/4W

No.	LDR	PT No.	DESCRIPTION
17-3571	COUNT D)	COUNT D)	
90	1313301002	METAL FILM	3.3K OHM
91	1313301002	METAL FILM	3.3K OHM
92	1711040002	METAL FILM	3.3K OHM
93	1311802002	METAL FILM	18K OHM
94	1313901006	METAL FILM	3.9K OHM
95	1313901006	METAL FILM	3.9K OHM
96	1010100000	CARBON FILM	1.0 OHM
97	1010100000	CARBON FILM	1.0 OHM
98	1313160000	METAL FILM	316 OHM
99	1315360000	METAL FILM	536 OHM
100	1311500006	METAL FILM	150 OHM
101	1311500006	METAL FILM	150 OHM
102	1311801000	METAL FILM	1.8K OHM
103	1311801000	METAL FILM	1.8K OHM
-VARIABLE RESISTORS-			
104	1711040006	CERMET	100 OHM
105	1711040006	CERMET	100 OHM
106	1711040006	CERMET	100 OHM
107	1711040006	CERMET	100 OHM
108	1711040425	CERMET	5K OHM
109	1711040425	CERMET	5K OHM
110	1711040425	CERMET	200 OHM
111	1711040425	CERMET	200 OHM
-CAPACITORS-			
112	2110210009	MICA	50pF
113	2120050005	MICA	220pF
114	26100104005	PLASTIC FILM	5pF
115	26100150009	MICA	0.1uF
116	26100104005	PLASTIC FILM	15pF
117	26100104005	PLASTIC FILM	0.1uF
118	21101516004	MICA	0.1uF
119	2110181003	MICA	18pF
120	2240100006	ELECTROLYTIC	1.0uF
121	2240100006	ELECTROLYTIC	1.0uF
122	2240202006	ELECTROLYTIC	22uF
123	2240202006	ELECTROLYTIC	22uF
124	2010103005	CERAMIC	0.01uF
125	2010103005	CERAMIC	0.01uF
126	21200106003	MICA	0.1uF
127	20900160006	CERAMIC	22uF
128	2240202006	ELECTROLYTIC	20pF
129	20900160006	CERAMIC	0.1uF
130	2240202006	ELECTROLYTIC	22uF
131	20900160006	CERAMIC	0.1uF
132	2240202006	ELECTROLYTIC	22uF
133	2240202006	ELECTROLYTIC	22uF
134	2240300003	ELECTROLYTIC	33uF
135	2120100004	MICA	1.0pF
136	2120330001	MICA	33pF
137	2120270009	MICA	27pF
138	20900160006	CERAMIC	0.1uF
139	20900160006	CERAMIC	0.1uF
-TRANSISTORS-			
140	2030320000	NPN	0.1
141	3010711007	NPN	0.2
142	3010726000	NPN	0.3
143	3010711007	NPN	0.4
144	2030471005	NPN	0.5
145	3030372005	NPN	0.6
146	3010495007	NPN	0.7
147	3030556005	NPN	0.8
148	3011402000	NPN	0.9
149	3030382008	NPN	0.10
150	3030382008	NPN	0.11
151	3010455007	NPN	0.12
152	3030372005	NPN	0.13
153	3010495007	NPN	0.14
154	30303815018	NPN	0.15
155	3011015012	NPN	0.16
156	3030372005	NPN	0.17
157	3011015012	NPN	0.18
158	3030372005	NPN	0.19
159	3010455007	NPN	0.20
-DIODES-			
160	3120058004	ZENER	0.1
161	3110060004	DETECTOR	0.2
162	3110060004	DETECTOR	0.3
163	3110060004	DETECTOR	0.4
164	3110060004	DETECTOR	0.5
165	3110060004	DETECTOR	0.6
166	3110060004	DETECTOR	0.7
167	3120028001	ZENER	0.8
168	3120059002	ZENER	0.9
169	3110060004	DETECTOR	0.10
170	3110060004	DETECTOR	0.11
171	3110060004	DETECTOR	0.12
-ZENER-			
172	131588	ZEN	4.7V
173	131588	ZEN	5.1V
174	131588	ZEN	5.6V
175	131588	ZEN	6.2V

No.	LDR	PT No.	DESCRIPTION
(T-3571) COUNTER			
D13	3110006004	DETECTOR	1S1588
D14	3110006004	DETECTOR	1S1588
D15	3110006004	DETECTOR	1S1588
D16	3110006004	DETECTOR	1S1588
D17	3110006004	DETECTOR	1S1588
D18	3110006004	DETECTOR	1S1588
D19	3110006004	DETECTOR	1S1588
D20	3110006004	DETECTOR	1S1588
D21	3110006004	DETECTOR	1S1588
D22	3110006004	DETECTOR	1S1588
D23	3110006004	DETECTOR	1S1588
D24	3120029003	ZENER	9.1V
D25	3120029003	ZENER	9.1V
D26	3110006004	DETECTOR	1S1588
D27	3110006004	DETECTOR	1S1588
D30	3110042008	BRIDGE RECTIFIER	U-02
-INTEGRATED CIRCUITS-			
IC1	3220075008	OP AMP	LF411
IC2	3220075008	OP AMP	LF411
IC3	3211496010	BAL MOD	MC1496L
-COILS-			
L3	3970159005	COIL	1.5uH 1.0%
L4	3970159005	COIL	3.9uH 1.0%
L5	3970159005	COIL	1.5uH 1.0%
-PC BOARD-			
	5903571026		T-35718

## 9. CABINET REMOVAL

- Take four screws, holding cord wrappers, to remove the Top and Bottom cover.

